



HU000035806T2

(19) **HU**(11) Lajstromszám: **E 035 806**(13) **T2****MAGYARORSZÁG****Szellemi Tulajdon Nemzeti Hivatala**

EURÓPAI SZABADALOM SZÖVEGÉNEK FORDÍTÁSA

(21) Magyar ügyszám: **E 13 709313**(22) A bejelentés napja: **2013. 02. 22.**(51) Int. Cl.: **E01F 7/04** (2006.01)**A01K 61/00** (2006.01)**B21F 27/04** (2006.01)

(96) Az európai bejelentés bejelentési száma:

EP 20130709313

(97) Az európai bejelentés közzétételi adatai:

EP 2817455 A1 **2013. 08. 29.**

(86) A nemzetközi (PCT) bejelentési szám:

PCT/EP 13/000518

(97) Az európai szabadalom megadásának meghirdetési adatai:

EP 2817455 B1 **2017. 12. 27.**

(87) A nemzetközi közzétételi szám:

WO 13124070

(30) Elsőbbségi adatok:

248122012 **2012. 02. 24.** **CH**

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(54) **Háló, főként védelmi, biztonsági, vízi tenyésztési vagy építészeti területeken történő alkalmazásra, valamint szerkezet a háló előállítására**

Az európai szabadalom ellen, megadásának az Európai Szabadalmi Közlönyben való meghirdetésétől számított kilenc hónapon belül, felszólalást lehet benyújtani az Európai Szabadalmi Hivatalnál. (Európai Szabadalmi Egyezmény 99. cikk(1))

A fordítást a szabadalmas az 1995. évi XXXIII. törvény 84/H. §-a szerint nyújtotta be. A fordítás tartalmi helyességét a Szellemi Tulajdon Nemzeti Hivatala nem vizsgálta.

Net, in particular for protection, safety, water rearing or architectural purposes, and an apparatus for producing the net

Description

The invention relates to a net, in particular for the areas of protection, safety, water rearing or architecture according to the preamble to Claim 1, and a device for producing the net.

Protective nets of this kind are characterized in that they possess a high resistance to tearing and good formability, and, as a result thereof, are capable of being loaded to a considerable degree. A suchlike protective net is disclosed in WO 2010/049089, which concerns a high-strength braided structure made of mutually twisted wire spirals, which are pressed flat into three-dimensional rows of meshes. This procedure allows the inexpensive manufacture of the braided structure.

The invention has as its object, while retaining these advantages, to improve the strength values of the net with simple constructive measures and, in addition, to facilitate the problem-free manufacture of such nets or braided structures.

The object is accomplished according to the invention according to the characterizing features of Claim 1 and of Claim 10 relating to the device.

These respectively elbow-shaped embodied curvatures between the elongate legs are produced according to the invention in such a way that the respective neighbouring legs are pressed flat against one another transversely to their longitudinal extension until arriving at the planar surface shape plus an additional angle.

In the inventive device, the elongate legs which result on achieving the planar flat shape are guided by holding means approximately over their entire length, and the elongate elements in each case protrude from the holding means only at the curvature.

The inventive elbows in the leg regions increase the flexibility of the net and loosen up the geometry of the net to some extent, which in the outdoors leads to an optically advantageous camouflage effect. Since these inventive nets are used above all in the outdoors against natural hazards, this is an advantage compared to conventional nets.

The elbows of the nets in addition lead to a loosened, three-dimensional structure, which produces novel optical effects for architectural applications, which can be used, for example, in large-area façade claddings.

For the purpose of a predominantly mirror-symmetrical design of the braided structure, the invention proposes that the elongate elements are provided with elbows alternatingly bent in opposite directions transversely to the net surface. This measure is desirable in particular when the elongate elements form rhombus-shaped meshes, the legs of which have elbows bent in opposite directions.

With a view to the use of the protective net under environmentally unfavourable conditions, the invention also proposes that the elongate elements are made of wires, cords or braids which are made of corrosion-resistant steel, stainless steel or anticorrosive-coated steel. The wires, cords or braids are



appropriately manufactured from high-strength steel with a nominal strength of 1000 N/mm² to 3200 N/mm².

It is advantageous for the purpose of an articulate end connection of the elongate elements if the wires, cords or braids are knotted into loops at their ends, by means of which they are connectable to one another in pairs with wire clamps, wire loops or similar connecting elements.

The invention is described in more detail below on the basis of illustrative embodiments with reference to the drawing. Is the drawing:

Fig. 1 depicts an inventive net, represented in simplified form in a view from the front,

Fig. 2 depicts an elongate element of the protective net according to Fig. 1 illustrated in perspective,

Fig. 3 and Fig. 4 each depict an embodiment of the elongate element in Fig. 2, represented in the direction of the arrow I in Fig. 1,

Fig. 5 depicts a perspective schematic view of two holding means of an inventive device for the manufacture of the net;

Fig. 6 to Fig. 8 each depict schematically two holding means in a schematic view, which are represented adjusted in relation to one another in three different positions and at the same time press a spirally-bent wire flat.

Represented in Fig. 1 is a part of a net 1, which can be used in particular as protective net against rock falls, landslides, avalanches, slope instabilities and similar natural hazards. It can also be used for aesthetic purposes in the safety area or in architecture. These are used, for example, as fencing systems, barrier systems and fall protection systems, splinter shields, protection against breaking and entry and escape, transit barriers against vehicles or ships, as well as for further safety-relevant net solutions. A suchlike net is also suitable however, as a protective net in baskets or enclosures for the marine farming of fish, mussels or shellfish.

The net 1 consists of a chain link 2, which is manufactured from elongate elements 3 in the form of spirally-bent steel wires 4, 5, 6, 7 according to Fig. 5. The spirally bent wires 4, 5, 6, 7 are mutually twisted together in pairs, woven together and in the process pressed flat in such a way that, at the end of the forming process, they receive the form depicted in Fig. 2 with consecutive legs 8a, 8b; 9a, 9b and curvatures 10a, 10b; 11a, 11b at regular intervals. The spiralled elongate elements 3 in this case are pressed flat in the leg regions 8a, 8b; 9a, 9b, in such a way that they are approximately rectilinear.

The resulting chain link 2 has rhombus-shaped meshes 12, of which the articulated knots 13 define the net surface 14 that is marked as a dot-dash line in Fig. 3 and Fig. 4 with an approximately planar surface shape A.

The wires of the elongate elements 3 are bent or knotted at their ends into loops 17a, 17b; 18a, 18b, which make it possible to connect the wires at their ends by means of wire clamps or wire loops or similar elements at the ends that are guided in pairs through the loops 17a, 17b or 18a, 18b. The knotted ends of the wires also permit a cost-effective connection with the neighbouring net sections of the

protective net. Of course, other comparable end connections can also be used instead of the knots for the wire ends of the elongate elements.

According to the invention, the spiralled elongate elements 3 are formed into an approximately planar surface shape A in the net surface 14, wherein the curvatures 10a, 10b; 11a, 11b are produced with an elbow-shaped form in each case. These elbow-shaped curvatures 10a, 10b; 11a, 11b are formed in such a way that the radius of curvature is very small or approximately zero on the inside of a respective curvature 10a, 10b; 11a, 11b.

In addition, within the scope of the invention, the elongate elements 3 are formed in such a way that they are approximately planar in the net surface 14 and are each provided in the leg region with one slight elbow 15a, 16b; 16a, 16b transversely to the net surface 14. The effect of this simple measure is that the net has higher tearing strength or ultimate tearing strength values and a clearly higher formability than it does in the absence of the elbows. As a result, it is capable of absorbing more kinetic energy in the event of an impact by a heavy object.

The elbows 15a, 15b; 16a, 16b are disposed approximately in the middle of the legs 8a, 8b; 9a, 9b alternately in opposite directions transversely to the net surface 14. They have a height of not more than a few millimetres, which is determined appropriately depending on the diameter of the elongate elements 3.

It is also possible within the scope of the invention to provide multiple elbows per leg running in the same and/or the opposite direction. Depending on the application, only a very small number of elbows permit advantageous elastic or plastic spring functions.

As can be appreciated from Fig. 3 and Fig. 4, it is also possible within the scope of the invention to vary the geometry of the wire mesh 2, provided that its elongate elements 2 remain approximately planar in the net surface 14 and their legs 8a, 8b; 9a, 9b are provided with slight elbows transversely to the net surface 14. Depending on the operating conditions, a braided structure made of cords or braids can also be used instead of the wire mesh.

The articulated connections 13 between the wires 3 facilitate the rolling up or folding up of the braided structure. That is advantageous for the transport and the storage of the net.

Fig. 5 to Fig. 8 depict schematically two holding means 21, 22 of an inventive device arranged in rows. These holding means 21, 22 are provided on the respective end face with a guiding groove 21', 22' receiving the wire 3 and disposed rotatably in relation to one another, in such a way that the guiding grooves 21', 22' are alternately mutually opposed and extend according to the gradient angle of the legs 8a, 8b; 9a, 9b. These holding means 21, 22 are adjustable back and forth in this case transversely to the longitudinal extension of the spirally-bent elongate elements 3 at a specified distance from one another via drivable linkages.

Illustrated in Fig. 6 is the start position of two of the holding means 21, 22 arranged in rows, which are set at a distance from one another according to the rise height of the individual wire coil. The spirally-bent wire 3 in this case is screwed into the guiding grooves 21', 22' in its longitudinal axis in a manner

similar to screwing-in, and in addition is threaded into a neighbouring already flattened wire at the same time, although this is not shown in more detail. The net can be manufactured continuously in this way.

Fig. 7 depicts the two holding means 21, 22 in a position in which they are displaced against one another and press the wire 3 flat.

The manner in which the respective elbow-shaped curvatures 10a of the elongate elements are produced between the elongate legs 8a, 8b can be appreciated from the end position of the holding means 21, 22 according to Fig. 8. The elongate legs 8a, 8b, which result in the achievement of the planar flat shape, are guided by the holding means 21, 22 approximately over their entire length, as is also apparent in Fig. 5. In this case, the elongate elements 3 protrude respectively from the holding means 21, 22 only at the curvature 10a, 10b.

The respective neighbouring legs 8a, 8b are pressed flat against one another transversely to their longitudinal extension until they arrive at the planar surface shape A plus an additional angle α . The respective elbow shape of the curvatures is favoured additionally by this overstretching of the legs, since a kind of increase in nominal strength is accomplished to a certain extent as a result, wherein said angle α , which is preferably between 10° and 30° , becomes smaller as the holding means are retracted and the elongate element is released by the springing-back of the legs.

For the production of the elbows 15a, 15b; 16a, 16b in the elongate elements 3, the holding means 21, 22 are equipped with pins 24, 25 that are likewise capable of moving in both directions transversely to the longitudinal extension of the elongate elements 3, which, in this end position of the holding means 21, 22 depicted in Fig. 8, are preferably moved vertically against the legs 8a, 8b to such an extent that these permanent elbows are formed.

Preferably high-strength wires with nominal strengths between 1000 N/mm^2 and 3200 N/mm^2 , which withstand a particularly high loading, are used in the case of nets made of wire mesh.

Depending on the intended use and the desired deformation behaviour, however, applications in the nominal strength range between 350 N/mm^2 to 1000 N/mm^2 are also appropriate.

Having regard for the conditions of use in the open air, stainless steels, corrosion-resistant steels or steels that are coated with a protection against corrosion are preferred. In the event of suchlike nets being used as baskets or enclosures in the farming of fish or mussels, they are provided with an antifouling-coating, which may contain copper, for example. In the event of the use of cords or braids, it is not necessary for them to consist exclusively of high-strength wires with the above-mentioned nominal strength values.

The production of round, cylindrically closed net elements, which net elements can be slipped over mussel farming elements, for example, is also facilitated by the inventive net. Cube-shaped bodies, for example, can also be produced from individual net elements.

The corresponding wire diameters for the inventive nets are preferably in the range from 0.5 mm to 5.0 mm. Braids (e.g. consisting of 2 to 7 wires) can also be used instead of individual wires.

The invention is adequately accomplished with the above illustrative embodiment. It could also be exemplified by other variants, however. For example, several or, theoretically, no elbows could thus be provided per leg element, depending on the application. Preferably an uneven number of elbows is advantageous in this case. Similar different forms also appropriately lead to inventive improvements instead of the previously mentioned elbow. Suchlike different forms can be of slightly elongated and/or oval-shaped configuration in the manner of an elbow.

Depending on the intended purpose of the net, the individual elongate elements can also be embodied in principle with different nominal strengths.

Háló, főként védelmi, biztonsági, vízi tenyésztési vagy építészeti területeken történő alkalmazásra, valamint szerkezet a háló előállítására

Szabadalmi igénypontok

1. Háló, főként védelmi, biztonsági, vízi tenyésztési vagy építészeti területeken történő alkalmazásra, amely háló egyedi csavarvonalban hajlított hosszanti elemekből (3), mint például huzalokból, egy rácsfonattá (1) van összefonva, ahol egyes henger, illetve csavar alakúvá hajlított hosszanti elemek (3) szomszédos hosszanti elemekkel kölcsönösen egymásba vannak forgatva és oly módon vannak összenyomva, hogy a rácsfonat (1) egy megközelítőleg sík felületi alakzatot (A), míg a hosszanti elemek (3) mindegyike eközben megközelítőleg egyenes vonalú száracat (8a, 8b; 9a, 9b) és közöttük görbületeket (10a, 10b; 11a, 11b) képez, *azzal jellemezve*, hogy a görbületek (10a, 10b; 11a, 11b) a hosszúkás szárac (8a, 8b; 9a, 9b) között rendre könyökszerűen vannak kialakítva, amelyek oly módon vannak létrehozva, hogy a mindenkor szomszédos szárac (8a, 8b; 9a, 9b) egymás felé, hosszanti kiterjedésükre keresztirányban össze vannak nyomva a sík felületi alakzat (A) plusz egy járulékos szög (α) eléréséig.

2. Az 1. igénypont szerinti háló, *azzal jellemezve*, hogy a csavart hosszanti elemek (3) mindegyike a szárac (8a, 8b; 9a, 9b) görbületek (10a, 10b; 11a, 11b) közötti tartományaiban legalább egy enyhe iránytöréssel (15a, 15b; 16a, 16b) van alakítva.

3. A 2. igénypont szerinti háló, *azzal jellemezve*, hogy az iránytörések (15a, 15b; 16a, 16b) mind a hálófelületre (14) keresztirányban terjednek ki és megközelítőleg a szár (8a, 8b; 9a, 9b) közepén vannak elrendezve.

4. A 2. vagy 3. igénypont szerinti háló, *azzal jellemezve*, hogy a hálófelületre (14) rendre keresztirányban kiterjedő iránytörések (15a, 15b; 16a, 16b) mind egy maximum néhány milliméteres magassággal rendelkeznek, amely előnyösen a hosszanti elemek (3) átmérőjétől függően van méretezve.

5. Az 1-4. igénypontok bármelyike szerinti háló, *azzal jellemezve*, hogy a hosszanti elemek (3) a hálófelületre (14) keresztirányban váltakozva ellentétes irányokban meghajlított iránytörésekkel (15a, 15b; 16a, 16b) rendelkeznek.



6. Az 5. igényponti szerinti háló, azzal jellemezve, hogy a hosszanti elemek (3) rombusz alakú hurokszemeket (12) képeznek, amelyek szárai (8a, 8b; 9a, 9b) ellentétes irányba hajlított iránytörésekkel (15a, 15b; 16a, 16b) vannak ellátva.
7. Az 1-6. igénypontok bármelyike szerinti háló, azzal jellemezve, hogy a hosszanti elemek (3) korrózióálló, rozsdamentes vagy korrózióvédelemmel bevont acélból levő huzalokból, sodronykötelekkel vagy pászmákból vannak előállítva.
8. Az 1-7. igénypontok bármelyike szerinti háló, azzal jellemezve, hogy a huzalok, sodronykötelek vagy pászmák nagyszilárdságú acélból, előnyösen 1000 N/mm^2 és 3200 N/mm^2 közötti névleges szilárdságú acélból vannak előállítva.
9. Az 1-8. igénypontok bármelyike szerinti háló, azzal jellemezve, hogy a huzalok, sodronykötelek vagy pászmák a végeiken hurkakká (17a, 17b; 18a, 18b) vannak csomózva, amelyek révén a végeiken egymással páronként huzalkapcsokkal ill. huzalhurkokkal vagy hasonló összekötő elemekkel csuklósan összeköthetők.
10. Szerkezet egy az 1-9. igénypontok bármelyike szerinti háló előállítására, amely szerkezet sorokban elrendezett nyomólapokat (21, 22) tartalmaz, amelyek a csavarvonalban hajlított hosszanti elemek (3) hosszanti kiterjedésére keresztirányban egymással szemben állíthatók és az előlő homlokoldalukon egy-egy, a hosszanti elemet központosító vezetőhoronnyal (21', 22') vannak ellátva, amelyek a szárok (8a, 8b; 9a, 9b) emelkedési szögének megfelelően húzódnak, ahol a nyomólapok kiindulási helyzetében egy csavarvonalban hajlított hosszanti elem a bélégek ezen vezetőhornaiba beforgathatók vagy behelyezhetők, miközben a hosszanti elem (3) a nyomólapok véghelyzetében össze van nyomva, ugyanakkor a görbületek (10a, 10b; 11a, 11b) mindenkor iránytöréses alakja úgy van létrehozva, hogy a sík felületi alakzat (A) elérésénél keletkező hosszúkás szárok (8a, 8b; 9a, 9b) megközelítőleg a teljes hosszuk mentén a nyomólapok (21, 22) által vannak megvezetve és a hosszanti elemek (3) mindenkor csak a görbületnél (10a, 10b; 11a, 11b) állnak ki a nyomólapokból (21, 22), ugyanakkor a szárok (8a, 8b; 9a, 9b) a sík felületi alakzat (A) plusz egy járulékos szög (α) eléréséig összenyomhatók a mindenkor görbületnél (10a, 10b; 11a, 11b).

Fig. 1

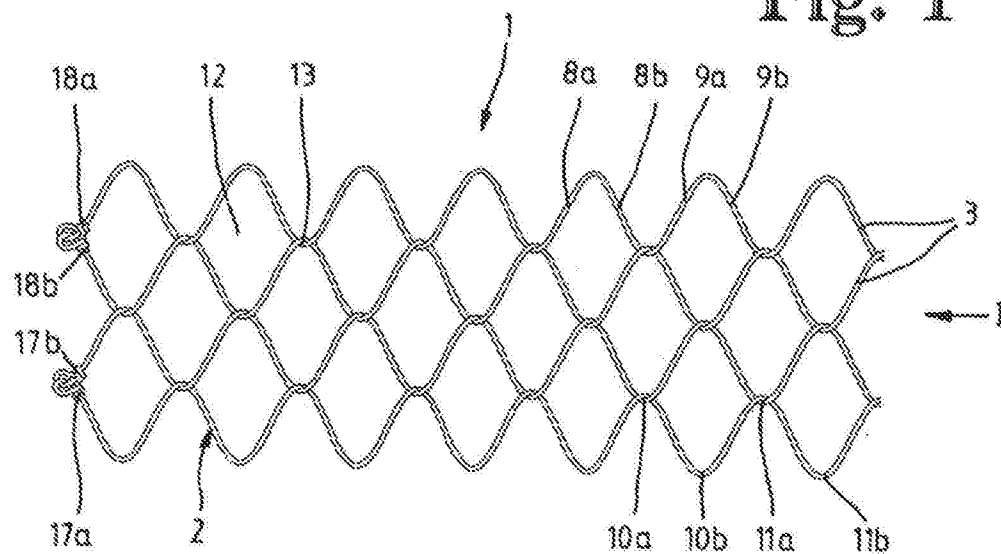


Fig. 2

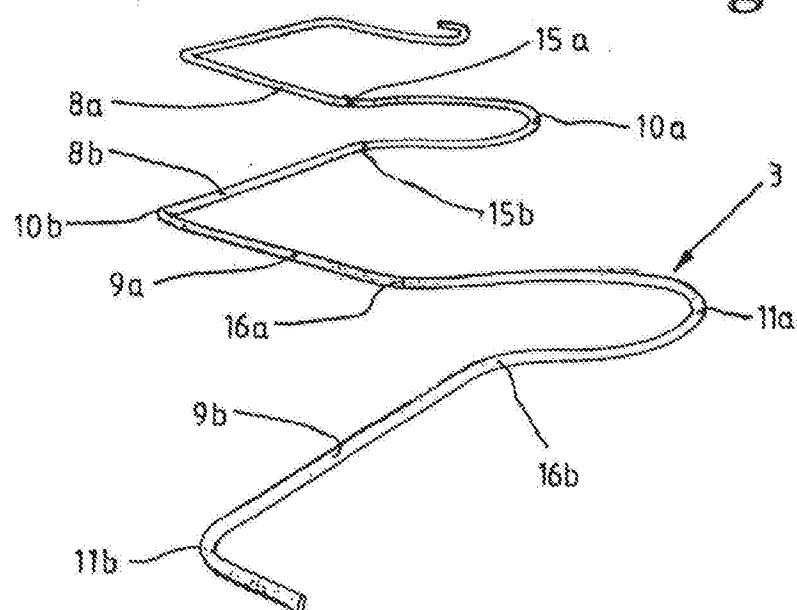


Fig. 3

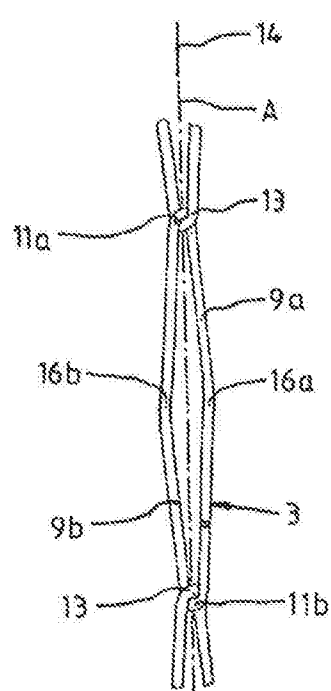


Fig. 4

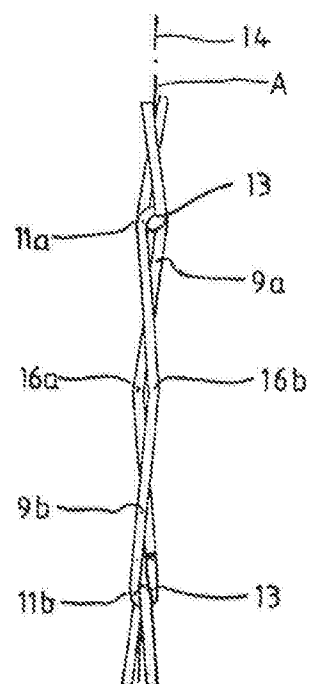


Fig. 5

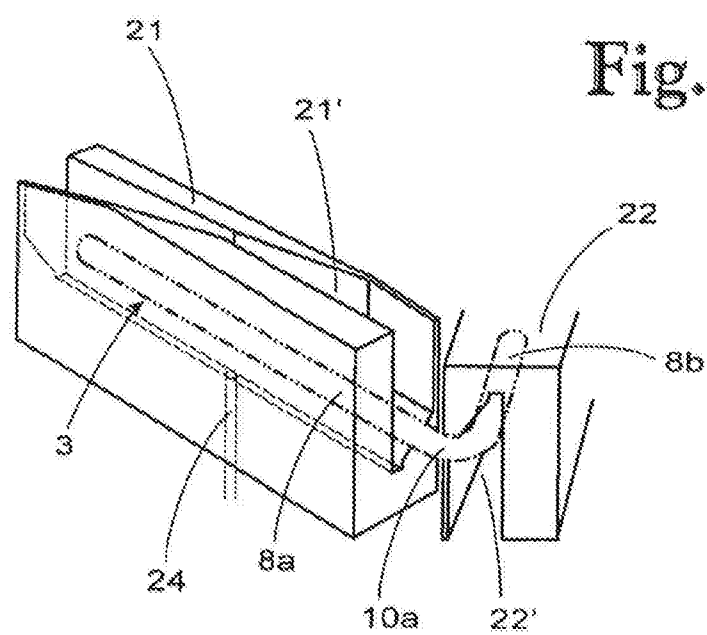


Fig. 6

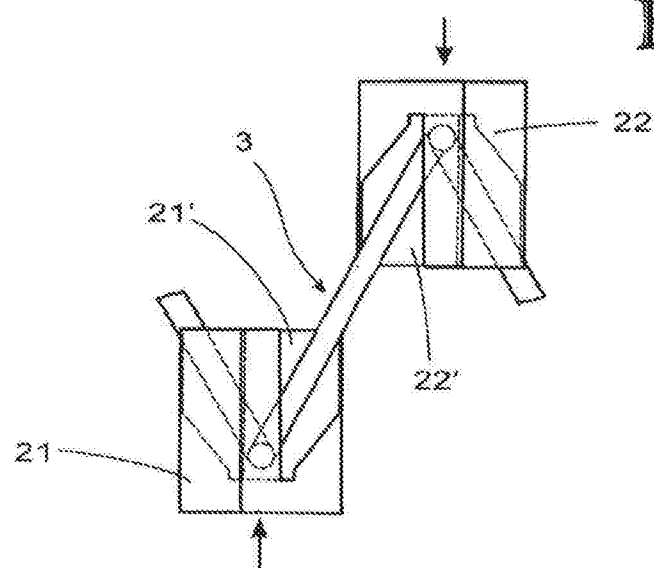


Fig. 7

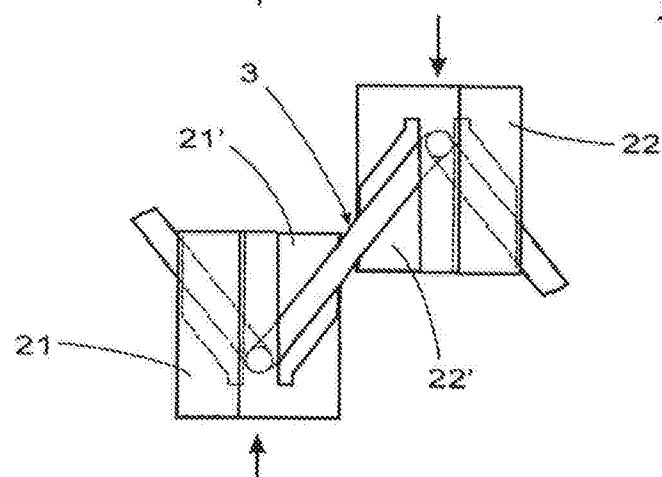


Fig. 8

